

ACVATIX™

2-port control ball valves, PN 25, with internally threaded connection

VAI51..



For use in heating, ventilation, and air conditioning plants as control or shutoff valve. In closed circuits.

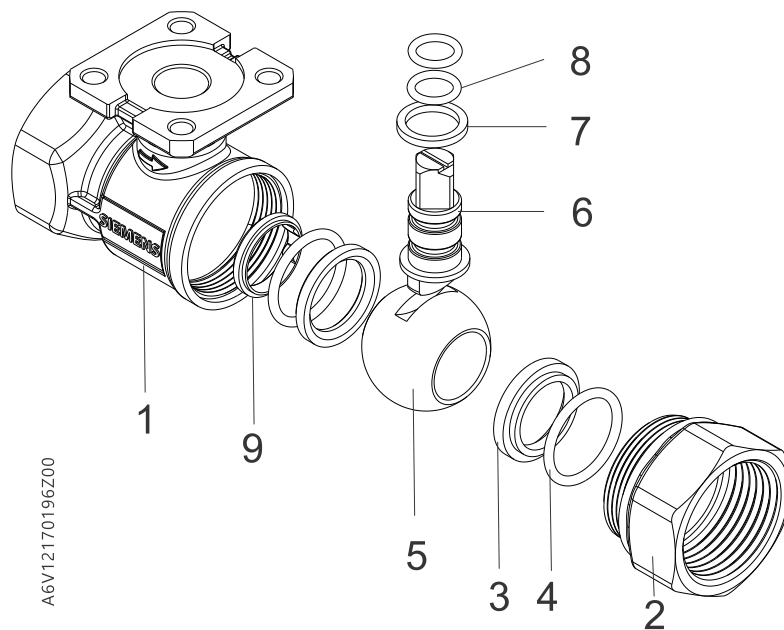
- Ball valve body made of brass, ball and stem made of stainless steel
- DN 15...50
- k_{vs} 4...63 m³/h
- Connections with internal threading Rp per ISO 7-1
- Rotational angle 90°
- Can be used with electromotorized rotary actuators GQD..9A, GMA..9E with spring return and GSD161.9A, GDB..9E, GLD161.9E, GLB..9E without spring return
- For applications with auxiliary functions (e.g. auxiliary switch, potentiometer, see [Applications with auxiliary functions](#)), can also be combined with standard rotary actuators

Features

- **Moderately price:**
Optimized flow rates mean smaller ball valves can be selected. Low torque means you can combine them with small, less expensive rotary actuators.
- **High life expectancy:**
Maintenance-free construction, also thanks to low friction stem and polished ball made of stainless steel.
- **Simple mounting:**
The brackets, pre-mounted on the actuators, means you can mount them on the ball valves without tools.

Technical design

Design



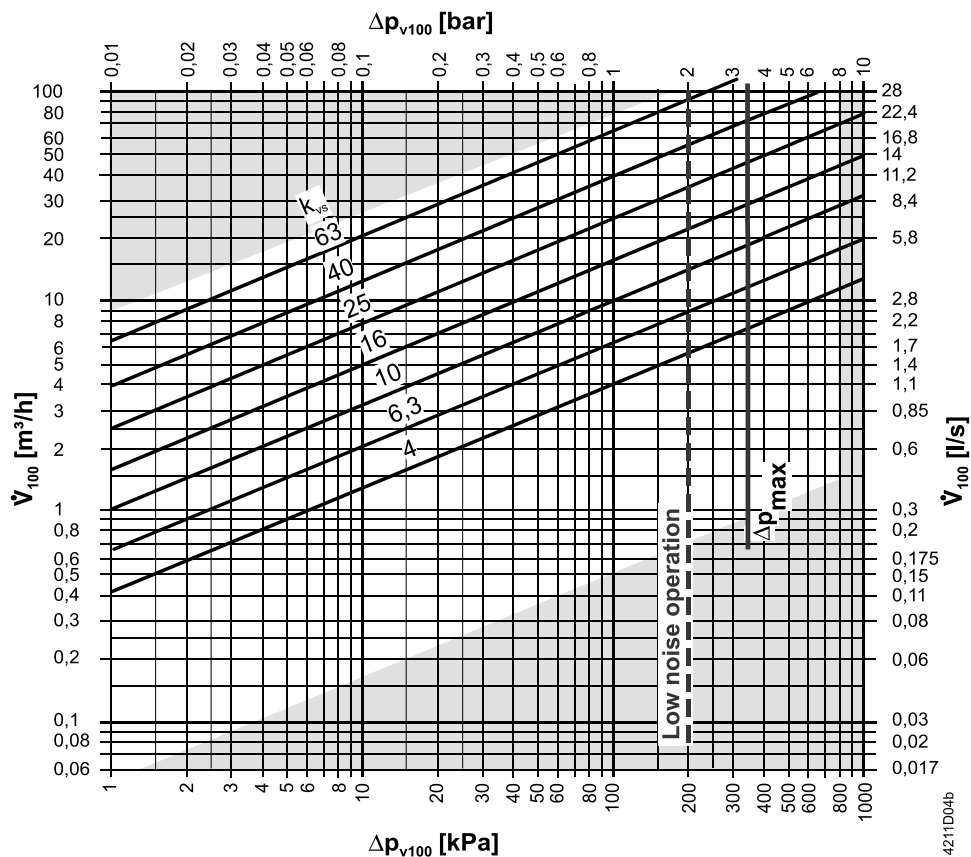
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- | | |
|---|--------------|
| 1 | Housing |
| 3 | Seat |
| 5 | Marble |
| 7 | Slide clutch |
| 9 | Flow plate |

- | | |
|---|--------------------------------|
| 2 | Internally threaded connection |
| 4 | O-ring seal |
| 6 | Stem, squared |
| 8 | O-ring seal |

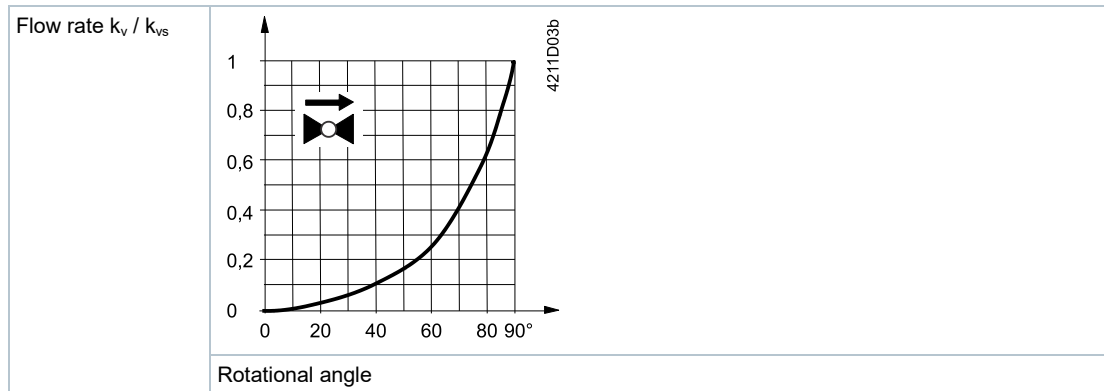
Sizing

Flow diagram:



- $\Delta p_{\max}$ for VAI51..., for details, see table on [Equipment combinations](#)
- $\Delta p_{\max}$ = Maximum permissible differential pressure over the ball valve, valid for the entire positioning range of the ball valve rotary actuator unit; if low noise operation is desired, we recommend a maximum permissible differential pressure of 200 kPa
- Δp_{v100} = Differential pressure over the fully opened ball valve and over the control path at a volume flow V_{100}
- V_{100} = Volume flow through the fully opened ball valve
- 100 kPa = 1 bar $\approx$ 10 mWS
- 1 m³/h = 0.278 l/s water at 20 °C

Ball valve characteristic curve



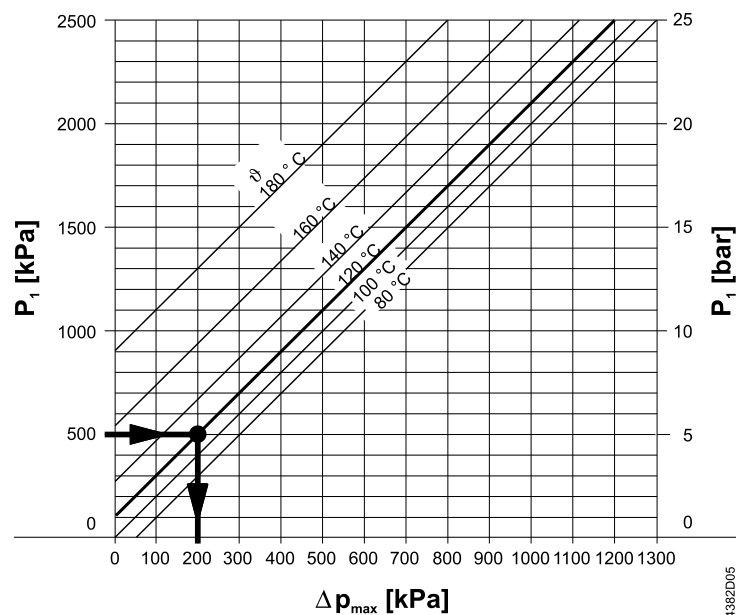
Flow characteristics

0...100 %

-> A — AB equal percentage, $n_{gl} = 3$ per VDI / VDE 2173

Cavitation

Cavitation increases wear and tear of the ball and seat and results in unwanted noise. Cavitation can be prevented by not exceeding the differential pressures as per the flow diagram and maintaining the static pressures depicted below.



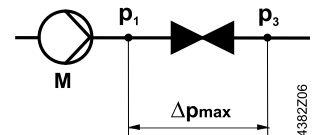
Δp_{max} = Differential pressure at a nearly closed ball valve to largely avoid cavitation

p_1 = Static pressure at the ball valve inlet

p_3 = Static pressure at the ball valve outlet

M Pump

ϑ Water temperature



Example with hot water:

Pressure p_1 at ball valve inlet: 500 kPa (5 bar)

Water temperature: 120 °C

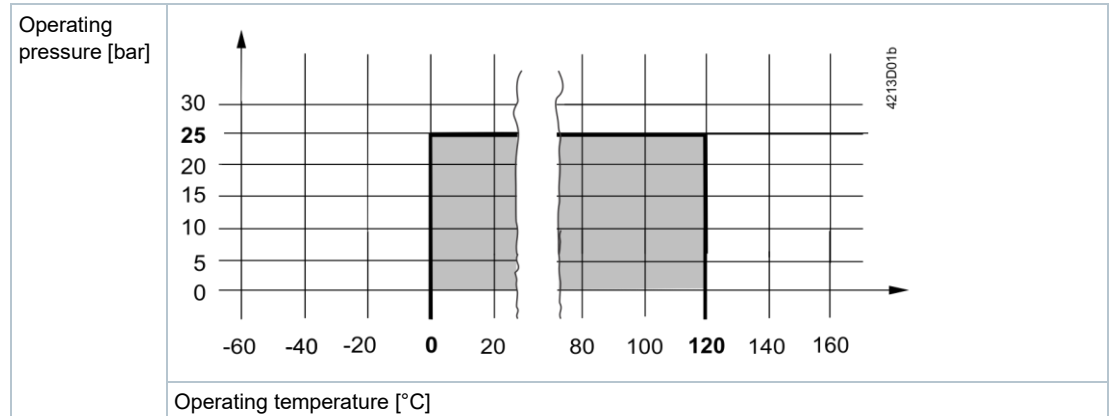
The above diagram clearly indicates that the maximum permissible differential pressure is $\Delta p_{\max} \rightarrow 200 \text{ kPa}$ (2 bar) at a nearly closed ball valve.

Note on chilled water applications

To prevent cavitation in chilled water circuits, sufficient counter pressure must be supplied to the ball valve outlet, e.g. using an additional butterfly valve downstream of the ball valve.
Maximum permissible differential pressure over the ball valve: See 80 °C curve in the above diagram.

Operating pressure and operating temperature

Liquids:



Operating pressure and medium temperature per ISO 7005

(Observe all local and applicable laws).

Type summary

Type	Stock number	DN	k_{vs}	S_v
			[m ³ /h]	
VAI51.15-4	S55230-V203	15	4.0	> 100
VAI51.15-6.3	S55230-V204		6.3	
VAI51.20-6.3	S55230-V205	20	6.3	
VAI51.20-10	S55230-V206		10	
VAI51.25-10	S55230-V207	25	10	
VAI51.25-16	S55230-V208		16	
VAI51.32-16	S55230-V209	32	16	
VAI51.32-25	S55230-V210		25	
VAI51.40-25	S55230-V211	40	25	
VAI51.40-40	S55230-V212		40	
VAI51.50-40	S55230-V213	50	40	
VAI51.50-63	S55230-V214		63	

DN = Nominal size

k_{vs} = Flow nominal value for chilled water (5...30 °C) through a fully opened ball valve at a differential pressure of 100 kPa (1 bar)

S_v = Rangeability k_{vs} / k_{vr}

k_{vr} = The smallest k_v value at which the characteristic curve tolerances can be maintained at a differential pressure of 100 kPa (1 bar)

Equipment combinations

Type	Rotary actuators											
	GQD..9A		GSD161.9A		GDB..9E		GMA..9E		GLD161.9E		GLB..9E	
	Δp _{max}	Δp _s	Δp _{max}	Δp _s	Δp _{max}	Δp _s	Δp _{max}	Δp _s	Δp _{max}	Δp _s	Δp _{max}	Δp _s
Ball valve	[kPa]											
VAI51.15-4	350	1400	350	1400	350	1400	350	1400	350	1400	350	1400
VAI51.15-6.3												
VAI51.20-6.3												
VAI51.20-10		600	350	600								
VAI51.25-10												
VAI51.25-16												
VAI51.32-16	—	—	—	—	—	—						
VAI51.32-25	—	—	—	—	—	—		1000		1000		1000
VAI51.40-25	—	—	—	—	—	—						
VAI51.40-40	—	—	—	—	—	—		800		800		800
VAI51.50-40	—	—	—	—	—	—						
VAI51.50-63	—	—	—	—	—	—		400		400		600

$\Delta p_{\max}$ = Maximum permissible differential pressure over the ball valve control path, valid for the entire positioning range of the ball valve rotary actuator unit; if low noise operation is desired, we recommend a maximum permissible differential pressure of ≤ 200 kPa

Δp_s = Maximum permissible differential pressure (closing pressure) at which the ball valve rotary actuator unit securely closes against the pressure

Overview of rotary actuators for ball valves

Type ¹⁾	Operating voltage	Positioning		Spring return		Data sheet
		Signal	Time	Function	Time	
GQD131.9A	AC/DC 24 V	3-position	30/15 s ²⁾	Yes	15 s	N4659
GQD161.9A		DC 0...10 V				
GSD161.9A	AC/DC 24 V	DC 0...10 V	30 s	—	—	A6V10636056
GDB141.9E	AC/DC 24 V	2 or 3 point	150 s	-	-	-
GDB341.9E	AC 100-240 V					-
GDB161.9E	AC/DC 24 V					A6V10636150
GMA131.9E	AC/DC 24 V	3-position	90/15 s ²⁾	Yes	15 s	N4658
GMA161.9E		DC 0...10 V				
GLD161.9E	AC 24 V / DC 24...48 V	DC 0/2...10 V	30 s	—	—	A6V11171770
GLB141.9E	AC/DC 24 V	2 or 3 point	150 s	-	-	A6V10636203
GLB341.9E	AC 100-240 V					
GLB161.9E	AC/DC 24 V					
GDB111.9E/KN	AC 24 V	KNX-TP	150/120 s	-	-	A6V107255318
GLB111.9E/MO	AC 24 V	Modbus RTU	150/120 s	-	-	A6V10938035

¹⁾ Actuator type: Electromotive

²⁾ Open/close

Ordering

Please indicate material, article type, order text, and quantity; example:

Material	Article type	Order text	Quantity
VAI51.25-16	VAI51.25-16	Open/close ball valve internally threaded, 2-Port	2
GLB161.9E	GLB161.9E	Actuator for ball valve, NSR	2

Delivery

Ball valves, rotary actuators, and mounting kits are not assembled and are delivered in individual packaging.

Applications with auxiliary functions

A standard actuator with corresponding functionality can be used if a ball valve application requires a rotary actuator with auxiliary functions (e.g. auxiliary switch or potentiometer). In this case, mounting kit ASK77.x is required in **addition** to the rotary actuator.

Follow the mounting instructions when mounting.

Rotary actuator	Options	Order text: Mounting kit
GMA1..1E (with spring return)	Potentiometer, auxiliary switch	ASK77.2 Accessory Kit BV for GMA1..1E
GDB..1E/GLB..1E (without spring return)	Potentiometer, auxiliary switch	ASK77.3 Accessory Kit BV for GDB..1E/GLB..1E
GQD..1A (with spring return)	Auxiliary switch	ASK77.5 Accessory Kit BV for GQD..1A
GSD..1A ¹⁾ (without spring return)	Auxiliary switch	ASK77.5 Accessory Kit BV for GSD..1A

Note:

¹⁾ GSD141.1A (S55499-D281) and GSD341.1A (S55499-D282) are not compatible with ball valves.

Product documentation

Related documents such as environmental declarations, CE declarations, etc., can be downloaded at the following Internet address:

<http://siemens.com/bt/download>

Notes

Safety



⚠ DANGER

There is a risk to operating personnel and device when working on the unit

Failure to comply with these safety notes can result in personal injury and damage to property from pipe pressure, electrical voltage, or device in operation.

▷ Note the following when servicing a ball valve/rotary actuator:

- Switch off both pump and operating voltage.
- Close shutoff valves.
- Release pressure in the pipes and allow them to cool down completely.
- Disconnect electrical connections from the terminals as needed.
- The rotary actuator must be properly installed prior to recommissioning the ball valve.



⚠ CAUTION

National safety regulations

Failure to comply with national safety regulations may result in personal injury and property damage.

- Observe national provisions and comply with the appropriate safety regulations.

Engineering

We recommend installing the ball valve on return water side since temperatures are lower on heating plants which increases the lifespan of the sealing gland on the stem.

Ensure there is no cavitation (see "[Cavitation](#)").

A filter must be installed upstream of the ball valve to increase functional safety.

Permissible media

Using the ball valve together with potassium formate-based media can result in leakage over the stem to the outside. The reason is the high level of penetration at low surface tension of media based on potassium formate.

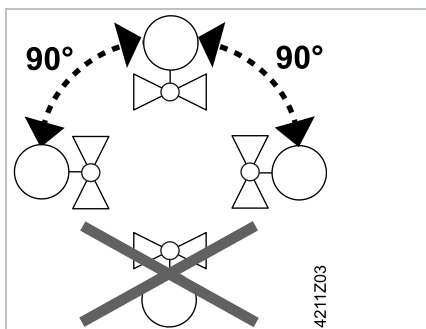
Siemens rejects any and all liability for damages or consequential damages resulting from the use of this media together with our ball valves.

Mounting

It is easy to assemble the ball valve and rotary actuator; it can be done at the construction site. No special tools or settings required.

Ball valve VAI51.. is supplied together with mounting instructions A6V12170257

Mounting position



Pipe connection

Avoid leakage:

- Install fittings as per ISO 7-1. Ball valves (internal threading) = "Rp"; Piping (external threading) = "R".
- Do not use too much hemp or PTFE tape.
- Do not tighten pipe threading to the very end.
- Place the pliers/wrench on the ball valve union nut that is closer to the pipe to be tightened or loosened.

Flow direction

Make sure that the valve is mounted in the proper flow direction. A symbol  is applied to the ball valve body:

Ball valve	Position as delivered	90 ° turned (clockwise)
VAI51.. Control ball valve 2-port -	 A – AB = 100 %	 A – AB = 0 %

Maintenance

Ball valves VAI51.. are maintenance free.

Disposal

Do not dispose of the device as part of domestic waste.

- Special handling of individual components may be required by law or make ecological sense.
- Adhere to all local and currently applicable laws and regulations.

Warranty

Technical data on specific applications are valid only together with Siemens products listed under "Equipment combinations". Siemens rejects any and all warranties in the event that third-party products are used.

Functional data	
	VAI51..
PN class	PN 25 per EN1333
Operating pressure	Per ISO 7005 within the permissible media temperature as per Operating pressure and operating temperature
Ball valve characteristic curve Through-port: 0...100 %	Equal percentage, $n_{gl} = 3$ per VDI / VDE 2173
Leakage through-port	< 0.01 % of Kvs value
Permissible media	Chilled water, low temperature hot water, hot water, water with antifreeze. Recommendation: Water treatment per VDI 2035 Note: See Permissible media
Medium temperature	0...120 °C
Rangeability Sv	> 100
Rotational angle	90 °

Materials	
Ball valve body	Brass Hpb59-1
Ball	Stainless steel (SUS303Cu)
Stem	Stainless steel (SUS304)
Valve seat / Sealing Gland	PTFE+Graphite

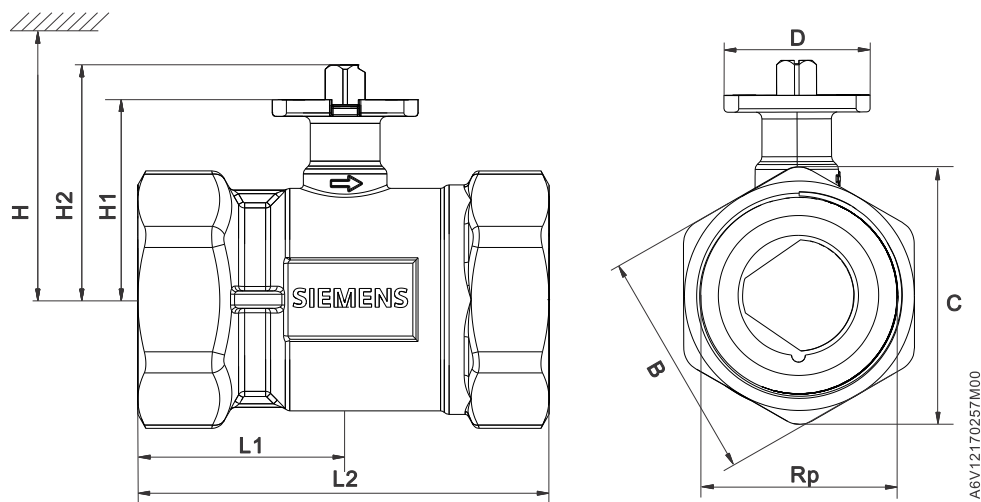
Dimensions / Weight	
See Dimensions	
Internally threaded connection	Rp per ISO 7-1

Standards, directives and approvals	
Pressure Equipment Directive	2014/68/EU
Pressure accessories	Range: Article 1, para. 1 Definition: Article 2, para. 5
Fluid group 2	≤ DN40 Without CE certification as per article 4, para. 3 (generally applicable engineering practice) ¹⁾ DN50 Category I, Module A, with CE-marking, as per article 14, section 2 EU Conformity A5W00154198A ²⁾
Environmental compatibility	Environmental Declaration A5W00157787A ²⁾ contains data on environmental-compatible product design and assessment (RoHS compliance, compositions, packaging, environmental benefits and disposal).

¹⁾ Fittings for a product where PS x DN < 1000, do not require special testing and cannot have CE labelling

²⁾ See [Product documentation](#)

Dimensions



- DN = Nominal size
H = Total height of actuator plus minimum mounting distance to wall or ceiling, for mounting, connection, operation, maintenance, etc.
H1 = Dimension from the pipe to the center to install actuator (upper edge)

VAI51..	DN	B	C	D	Rp	L1	L2	H1	H2	H						kg
										GQD..9A	GSD 161.9A	GDB..9E	GMA..9E	GLD 161.9E	GLB..9E	
										[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	
VAI51.15..	15	26	29	42	Rp ½	30	59.5	35	45	> 305	> 305	> 305	> 305	> 305	> 305	0.26
VAI51.20..	20	31.5	35.1	42	Rp ¾	31	62.5	38	48							0.31
VAI51.25..	25	38.5	43.5	42	Rp 1	38.5	77	42	52	> 325	> 325	> 325	> 325	> 325	> 325	0.44
VAI51.32..	32	47.5	53.5	42	Rp 1¼	46	90	47	57							0.65
VAI51.40..	40	54.5	61.5	42	Rp 1½	51	101	51	61	-	-	-	> 340	> 340	> 340	0.96
VAI51.50..	50	66.5	74	42	Rp 2	59.4	118	57.5	67.5	-	-	-				1.39

Revision numbers

Type	Valid from rev. no.	Type	Valid from rev. no.
VAI51.15-4	..A	VAI51.32-16	..A
VAI51.15-6.3	..A	VAI51.32-25	..A
VAI51.20-6.3	..A	VAI51.40-25	..A
VAI51.20-10	..A	VAI51.40-40	..A
VAI51.25-10	..A	VAI51.50-40	..A
VAI51.25-16	..A	VAI51.50-63	..A

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